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P R E F A C E.

MANKIND have ever found a state of society subservient to their comfort and happiness. Subjected to many wants, they have been able, by an union one with another, to obtain that supply, which would have been impracticable if each individual had stood alone ; and invariable experience has taught, that the social bond is the greatest security against the numberless dangers and difficulties, to which they are exposed. Hence the many political or civil institutions, that have been formed in the world, which have been greater or less blessings to the persons, who have belonged to them, in proportion as those institutions have been framed with more or less wisdom, and the members of them have been more or less virtuous and prudent.

Societies for promoting useful knowledge may be highly advantageous to the communities, in which they are instituted. Men united together, and frequently meeting for the purpose of advancing the sciences, the arts, agriculture, manufactures and commerce, may oftentimes suggest such hints to one another, as may be improved to important ends : and such societies, by being the repositories of the observations and discoveries of the learned and ingenious, may, from time to time, furnish the world with useful publications, which might otherwise be lost : for men of ingenuity, and modesty, may not chuse to risk their reputation, by sending abroad, unpatronized, what a learned society might judge richly worthy the public eye ; or, perhaps, their circumstances being straitened, they may not be able to defray the expence of publication. Societies instituted for promoting knowledge, may also be of eminent service, by exciting a spirit of emulation, and enkindling those sparks of genius, which otherwise might forever have been concealed ; and if, when possessed of funds sufficient for the purpose, they reward the exertions of the industrious and enterprising, with pecuniary premiums or honorary medals, many important experiments and useful discoveries will be made, from which, the public may reap the highest advantages.

Eminent instances of the beneficial effects of such institutions we have, in the Royal Academy of Sciences at *Paris*, the Royal Society, and the Society instituted for the encouragement of Arts, Manufactures

Manufactures and Commerce, in *London*, and many others of a similar kind, in *Europe*. Hereby a spirit of discovery and improvement has been excited among the ingenious, in almost every nation, in that quarter of the world ; and knowledge of various kinds, and greatly useful to mankind, has taken place of the dry and uninteresting speculations of schoolmen ; and bold and erroneous hypothesis has been obliged to give way to demonstrative experiment. In short, since the establishment of these societies, solid learning and philosophy have more increased, than they had done for many centuries before.

But the spirit of promoting knowledge, by instituting literary societies, has not been confined to *Europe* : It has found its way to *America*. Some years ago, a number of gentlemen in *Philadelphia*, voluntarily formed themselves into a society, by the title of, *The American Philosophical Society*. They have published one volume of transactions, which has done them honor.

In this Commonwealth, a society for promoting useful knowledge was, for many years, in contemplation ; but the design was never vigorously engaged in and pursued, 'till the end of the year 1779, when many gentlemen, persuaded of the utility of such an institution, determined, without delay, to use their endeavors, to have one formed upon a liberal and extensive plan, and at the same time, to have it established upon a firm basis, by obtaining the sanction of the Legislature. And to the honor of our political Fathers be it spoken, that although the country was engaged in a distressing war, a war the most important to the liberties of mankind, that was ever undertaken by any people, and which required the utmost attention of those, who were entrusted with our public concerns, they immediately adverted to the usefulness of the design, entered into its spirit, and incorporated a society, with ample privileges, by the name of, *The American Academy of Arts and Sciences*. The purpose of this institution is to promote most branches of knowledge advantageous to a community, as will appear, by the following charter of incorporation, which was granted May 4, 1780.

“ An ACT to incorporate and establish a Society for the cultivation and promotion of Arts and Sciences.”

“ AS the Arts and Sciences are the foundation and support of agriculture, manufactures, and commerce ; as they are necessary to the wealth,
 “ peace, independence and happiness of a people ; as they essentially promote
 “ the honor and dignity of the government which patronises them ; and
 as

“ as they are most effectually cultivated, and diffused through a State,
 “ by the forming and incorporating of men of genius and learning into
 “ public societies : For these beneficial purposes,

“ Be it therefore enacted by the Council and House of Representatives in
 “ General Court assembled, and by the authority of the same, That the
 “ Hon. Samuel Adams, Esq; Hon. John Adams, Esq; John Bacon,
 “ Esq; Hon. James Bowdoin, Esq; Rev. Charles Chauncy, D. D. Rev.
 “ John Clark, David Cobb, Esq; Rev. Samuel Cooper, D. D. Hon.
 “ Thomas Cushing, Esq; Hon. Nathan Cushing, Esq; Hon. William Cusht-
 “ ing, Esq; Tristram Dalton, Esq; Hon. Francis Dana, Esq; Rev.
 “ Samuel Deane, Rev. Perez Fobes, Rev. Caleb Gannett, Hon. Henry
 “ Gardner, Esq; Mr. Benjamin Guild, Hon. John Hancock, Esq; Hon.
 “ Joseph Hawley, Esq; Edward Augustus Holyoke, Esq; Dr. Ebenezer
 “ Hunt, Jonathan Jackson, Esq; Dr. Charles Jarvis, Rev. Samuel
 “ Langdon, D. D. Hon. Levi Lincoln, Esq; Rev. Daniel Little, Rev.
 “ Elijah Lothrop, John Lowell, Esq; Rev. Samuel Mather, D. D. Samuel
 “ Moody, Esq; Hon. Andrew Oliver, Esq; Dr. Joseph Orne, Dr.
 “ Theodore Parsons, Hon. George Partridge, Esq; Hon. Robert Treat
 “ Paine, Esq; Rev. Phillips Payson, Samuel Phillips, jun. Esq; Hon.
 “ John Pickering, Esq; Hon. Oliver Prescott, Esq; Rev. Zedekiah
 “ Sanger, Hon. Nathaniel Peaslee Serjeant, Esq; Micajah Sawyer, Esq;
 “ Theodore Sedgwick, Esq; Hon. William Sever, Esq; Stephen Sewall,
 “ Esq; Hon. David Sewall, Esq; John Sprague, Esq; Ebenezer Storey,
 “ Esq; Caleb Strong, Esq; Hon. James Sullivan, Esq; Dr. John Bernard
 “ Sweat, Mr. Nathaniel Tracy, Cotton Tufts, Esq; Hon. James Warren,
 “ Esq; Rev. Samuel West, Rev. Edward Wigglesworth, Rev. Joseph
 “ Willard, Rev. Samuel Williams, Rev. Abraham Williams, Rev. Nehemiah
 “ Williams, and Mr. James Winthrop, be, and they hereby are formed
 “ into, constituted and made a Body Politic and Corporate, by the
 “ name of THE AMERICAN ACADEMY OF ARTS AND SCIENCES ;
 “ and that they and their successors, and such other persons as
 “ shall be elected in the manner hereafter mentioned, shall be, and
 “ continue a Body Politic and Corporate, by the same name forever.

“ And be it further enacted by the authority aforesaid, That
 “ the Fellows of the said Academy may from time to time
 “ elect a President, one or more Vice Presidents, one or more
 “ Secretaries, and such other Officers of the said Academy, as they
 “ shall judge necessary or convenient ; and they shall have full
 “ power and authority from time to time to determine and esta-
 “ blish the names, number and duties, of their several officers, and
 “ the tenure or estate they shall respectively have in their offices ;
 “ and also to authorize and empower their President, or some
 “ other

“ other Fellow of the Academy, at their pleasure, to administer
 “ such oaths to such officers as they shall appoint and determine,
 “ for the well ordering and good government of the said Academy :
 “ provided the same be not repugnant to the laws of this State.

“ *And be further enacted by the authority aforesaid,* That the Fellows
 “ of the said Academy shall have one common seal, which they
 “ may make use of in whatsoever cause or business shall concern
 “ the Academy, or be relative to the end and design of its institu-
 “ tion ; and shall have power and authority from time to time
 “ to break, change, and renew the common seal, at their pleasure ;
 “ and that they may sue and be sued in all actions, real, personal
 “ and mixed, and prosecute and defend the same unto final judg-
 “ ment and execution, by the name of, The President and
 “ Fellows of the *American Academy of Arts and Sciences.*

“ *And be it further enacted by the authority aforesaid,* That the
 “ Fellows of the said Academy may from time to time elect such
 “ persons to be Fellows thereof, as they shall judge proper ; and
 “ that they shall have full power and authority from time to time,
 “ to suspend, expel or disfranchise, any Fellow of the said Acade-
 “ my, who shall by his conduct render himself unworthy of a
 “ place in that body, in the judgment of the Academy ; and also
 “ to settle and establish the rules, forms and conditions of election,
 “ suspension, expulsion and disfranchisement. *Provided,* That the
 “ number of the said Academy, who are inhabitants of this State,
 “ shall not, at any one time, be more than two hundred, nor less
 “ than forty.

“ *And be it further enacted by the authority aforesaid,* That the Fel-
 “ lows of the said Academy shall have full power and authority
 “ from time to time, to make and enact such reasonable rules, or-
 “ ders and bye-laws, not repugnant to the laws of this State, as
 “ shall be necessary or convenient for the well ordering and good
 “ government of the said Academy ; and to annex reasonable pe-
 “ cuniary fines and penalties to the breach of them, not exceeding
 “ the sum of *twenty pounds*, to be sued for and recovered in any
 “ Court of record within this State, in the name and for the use
 “ of the President and Fellows of the said Academy ; and the
 “ same rules, orders and bye-laws to repeal at their pleasure : And
 “ also to settle and establish the times, places, and manner of con-
 “ vening the Fellows of the said Academy : And also to deter-
 “ mine the number of Fellows which shall be present, to consti-
 “ tute a meeting of the said Academy. *Provided,* That the Fel-
 “ lows of the said Academy shall meet twice in a year at the least ;
 “ and

"and that the place of their meeting shall never be more than
"thirty miles distant from the town of *Boston*.

“ And be it further enacted by the authority aforesaid, That the Fel-
 “ lows of the said Academy may, and shall forever hereafter be
 “ deemed capable in the law of having, holding, and taking in
 “ fee-simple, or any less estate, by gift, grant, devise or otherwise,
 “ any lands, tenements, or other estate, real and personal : *Provided,*
 “ That the annual income, of the said real estate, shall not exceed
 “ the sum of *five hundred pounds*, and the annual income or interest
 “ of the said personal estate shall not exceed the sum of *two thousand*
 “ *pounds*. All the sums aforementioned in this act to be valued in
 “ silver, at the rate of *six shillings and eight-pence* by the ounce. And
 “ the annual interest and income of the said real and personal estate,
 “ together with the fines and penalties aforesaid, shall be appro-
 “ priated for premiums to encourage improvements and disco-
 “ veries in agriculture, arts and manufactures, or for other pur-
 “ poses, consistent with the end and design of the institution of the
 “ said Academy, as the Fellows thereof shall determine.

“ And be it further enacted by the authority aforesaid, That the
“ end and design of the institution of the said Academy is, to pro-
“ mote and encourage the knowledge of the antiquities of *America*,
“ and of the natural history of the country, and to determine the
“ uses to which the various natural productions of the country
“ may be applied ; to promote and encourage medical discoveries,
“ mathematical disquisitions, philosophical enquiries and experi-
“ ments ; astronomical, meteorological and geographical observa-
“ tions ; and improvements in agriculture, arts, manufactures
“ and commerce ; and in fine, to cultivate every art and science,
“ which may tend to advance the interest, honor, dignity and
“ happiness of a free, independent and virtuous people.

“ *And it is further enacted,* That the place where the first meeting
“ of the Fellows of the said Academy shall be held, shall be the
“ Philosophy Chamber in the University of *Cambridge*; and that the
“ Honorable *James Bowdoin*, Esq; be, and he hereby is authorized
“ and empowered to fix the time for holding the said meeting,
“ and to notify the same to the Fellows of the Academy.”

Such is the basis, upon which this institution is placed.

Not many months after this act of incorporation was passed, the statutes were formed, the body became organized, and communications were received. From the communications till the end of the year 1783, the following volume is now offered to the public.

This country being young, and few among us having such affluence and leisure as to admit of their applying much time to the cultivation of the sciences, and to the making of improvements in arts, manufactures, agriculture, &c. it will not, at present, be expected, that this Academy should vie with similar institutions in old countries, where they have peculiar advantages for such prosecutions. Yet, it is hoped, that the following papers will not be reckoned useless, nor prove unacceptable to the public.

The astronomical and mathematical papers, in this volume, will, perhaps, be the least entertaining of any in the collection, and will have the smallest number of readers. However, they are useful in such a work. Few, if any of them, contain deep speculations and obtruse researches and calculations; but they are chiefly of the practical kind. The astronomical pieces principally exhibit such observations and deductions, as are subservient to the cause of geography and navigation, the improvement of which is of great importance to this country. And as astronomical observations may be applied to ends so valuable, it is earnestly to be wished, that every gentleman capable of it, would improve every opportunity to make them with accuracy, and when made, would kindly communicate them to the Academy. These, and all mathematical pieces, will be gratefully received, and due attention paid to them, by this body.

To some readers, the subject of many papers, which have a place in the physical part, may seem unimportant; but it ought to be remembered, that one interesting pursuit of the Academy is the natural history of their own country;—a country, where the arts of defence and the means of subsistence have, hitherto, almost engrossed the industry of its inhabitants; where the fossil and vegetable kingdoms are yet unexplored, and perhaps, their most valuable productions still undiscovered.

It is the part of a patriot-philosopher to pursue every hint—to cultivate every enquiry, which may eventually tend to the security and welfare of his fellow citizens, the extension of their commerce, and the improvement of those arts, which adorn and embellish life. Nor can such traces and vestiges, as may occur, of the manners and resources of its aboriginal inhabitants, be unworthy the collection. Besides the idea thus excited of the condition of man in savage life, the present inhabitants of the same climate and soil may thereby, in some way or other, occasionally receive hints, which may be improved to their own advantage. This principle, which has govern-

ed the Academy in making the selection, will account for the introduction of some articles, relating to the natural history of the country.

Many pursuits, in various branches of natural philosophy, are retarded, by the difficulty of obtaining that variety of instruments, which can be had only from those countries, where the manufactures, which minister to the arts, are established in perfection. But this difficulty, it is hoped, will daily lessen, and ere long, entirely cease.

The medical papers may, probably, contain many observations not entirely new. However, this ought not to be considered a sufficient objection to their being inserted in this work, because many important discoveries in pathology, as well as in the animal economy, have been in a great measure useless to this part of the world, in consequence of a situation so remote from ancient seats of learning and improvement. And of such publications as have reached this country, the smallness of the number has greatly limited their usefulness, as but few have had opportunity for perusing them. In points merely speculative, this inconvenience has been less consequential; but, in practical science, deeply to be regretted. A long war, in which these States were engaged, destroyed, for a time, that intercourse, by means of which, books on the various arts and sciences, and such as contained the most modern discoveries and improvements, had usually been obtained. The contents of some of these papers, therefore, though they may afford nothing new to the *European*, yet, to many *American* readers may have the recommendation of novelty.

It may be further remarked, that although the novelty of an opinion or discovery may, sometimes, more advance the fame and honour of the author, yet, that there are known facts, of such a nature, that the repetition of them, in publications of this kind, may be no less useful to the world, as they may thereby be more forcibly impressed upon the mind, and conveniently adverted to, in common practice.

Upon these principles the Academy conceived it to be their indispensable duty to publish, by means best adapted to the purpose of diffusing their utility, such experiments and observations, as, though not new, yet, not having been sufficiently attended to, may be more extensively applied towards perfecting the present modes of practice in this country, as well as to communicate, by the earliest opportunities, such discoveries, as may lead to the investigation of important phenomena, in the animal œconomy.

It is obvious that the following work is well calculated for answering these intentions. The circulation of it will be principally confined to these States ; and as a repository of miscellaneous papers on the subject of physic and surgery, it will, doubtless, generally fall into the hands of gentlemen of the faculty in this country ; a circumstance, which will very rarely take place, with respect to any publication imported from abroad.

The Members of the Academy are disposed to do every thing in their power to promote the designs of the institution ; but they are sensible, that much aid is wanted from others ; and they are happy to have it in their power to acquaint the public, that from the number of valuable communications, which have been made by gentlemen in various parts of the country, there is reason to expect, that their assistance will be continued, and such materials furnished, as will not be unworthy the notice of the public, which it is the sincere wish of the Academy to serve. And from that expectation, and the great encouragement given to the printing of this volume, they have the pleasing prospect, that they shall be able to publish a succession of volumes. The papers they now have in their hands will go a considerable way towards another ; and they doubt not, they shall soon have sufficient to complete it.

There is now an ample field opened, in this country, in which the ingenious may expatiate ; and men of various turns of mind may employ their leisure, not only to their own amusement and improvement, but also to the emolument of the community.

Agriculture stands in great need of attention. As the solid prosperity of the country will much depend upon the cultivation of our lands, too much regard cannot be paid to this subject. To examine the various soils, and determine what each is best adapted to produce ; to ascertain the most suitable manures, and the means of increasing them ; to devise methods to secure the fruits of the field, and of the trees from blights and destructive insects, will afford a fine opportunity for experiments, which, it is hoped, will engage the minds of the curious and inquisitive, and meet with encouragement from gentlemen of property.

The genius for natural history may have a large range, as the fossil, the vegetable and animal kingdoms, in this part of the world, lie before him.

There will be ample room for the researches of the Botanist and Chymist, who, while they pursue their respective branches, may greatly contribute to the advancement of the healing art, which is of the highest importance to the inhabitants of a country.

The

The labors of the Astronomer are much needed, and will be peculiarly useful,—particularly those observations and calculations, which will serve to perfect the geography of the country, and improve navigation, as has before been intimated. Hereby, the boundaries between one State and another in the Union, may be accurately determined, and disputes prevented or settled; the latitudes and longitudes of our sea-ports and head lands ascertained, and our intercourse with foreign nations facilitated.

The various mechanical arts and manufactures, together with commerce, require peculiar attention and cultivation; and much may be expected, from that spirit of enterprise, which our citizens are known to possess. Happily, they who are engaged in these several branches of business may mutually aid each other; and every improvement they make, will tend to enrich and aggrandize these confederated States.

But this preface would far exceed the proper limits, should all those branches of business and of science be pointed out, which ought to be attended to and cultivated, by the inhabitants of these States. Let it only be added, that, settled in an extensive country, bordering upon the ocean, and open to a free intercourse with all the commercial world—A country comprehending several climates and a rich variety of soils, watered and fertilized by a multitude of springs and streams, and by many grand rivers, some of them admitting of a fine inland navigation,—the citizens have great opportunities and advantages for making useful experiments and improvements, whereby the interest and happiness of the rising empire may be essentially advanced. At the same time, enjoying, under a mild but steady government, that freedom, which excites and rewards industry, and gives a relish to life—That freedom which is propitious to the diffusion of knowledge, which expands the mind, and engages it to noble and generous pursuits,—they have a stimulus to enterprise, which the inhabitants of few other countries can feel. May they ever be as virtuous and industrious as they are free! May a spirit for advancing every kind of knowledge, that can redound to their honor, and promote the emolument and happiness of themselves and their country, more and more prevail! And may all their laudable endeavors, to further the good of mankind, be crowned with success adequate to their highest wishes!

November 16, 1785.

